DTE Record Request 13

Request:

Produce a simulation of noise levels at the three residences of interest with the transformers running at the OA noise levels for phase 1 construction.

Response:

Table 1
Predicted Future Background Sound Levels During Phase I Operation – OA Operation

Noise Receptor Locations		**Measured Background Sound Level, dBA[3]**		**Predicted Facility Sound Level, dBA[4]**	**Future Background Sound Level w/ Facility, dBA**		**Future Background Sound Level Increase Due to Facility, dBA**	
NML	Description	*min*[1]	*max*[2]		*min*[1]	*max*[2]	*min*[1]	*max*[2]
R1	Residence located approximately 375 feet west-southwest of the substation boundary.	38	51	42	43	52	5	1
R2	Residence located approximately 430 feet northwest of the substation boundary.	38	51	39	42	51	4	0
R3	Residence located approximately 610 feet south-southwest of the substation boundary.	38	51	40	42	51	4	0

NOTES
1. During the quietest measured background noise.
2. During loudest measured background noise.
3. Assumes the measured ambient sound levels are representative of R1, R2, and R3 ambient sound levels.
4. Based on OA operation.

DTE Record Request 14

Request:

What is the effect of the railroad berm on the noise generated by the transformers at a given wavelength?

Response:

The Cadna noise model is limited to evaluating noise emissions on an octave band basis. The 125 Hz octave band includes the frequencies from 88 Hz to 177 Hz. Based on the modeling calculations, the railroad berm provides approximately 1 – 2 dB reduction in the 125 Hz band. The attenuation is limited for two primary reasons. First, natural terrain is less effective at attenuating sound waves in the lower frequencies than in higher frequencies. Secondly, the receptors are elevated above the substation equipment thus reducing the diffraction path of the sound waves between the transformers and the receptors.

DTE Record Request 15

Request:

Produce a calculation of the sound levels at the three residences at the height of 20 feet. Describe the height that will be used for the sound source for the transformers.

Response:

Please refer to Table 2 and Table 3 below. It is important to note that the measured background sound levels are representative of a receptor at 5 feet above grade and that background sound levels may be slightly different at 20 feet above grade due to reduced ground attenuation and improved line of sight between the receptor and neighborhood noise sources. As such, the *increase* in future background sound levels may be slightly lower than the levels presented in Table 2 and Table 3.

Table 2
Predicted Future Background Sound Levels During Phase I Operation
Receptors Located 20 Feet Above Grade – OA Operation

Noise Receptor Locations		**Measured Background Sound Level, dBA[3]**		**Predicted Facility Sound Level, dBA[4]**	**Future Background Sound Level w/ Facility, dBA**		**Future Background Sound Level Increase Due to Facility, dBA**	
NML	Description	*min*[1]	*max*[2]		*min*[1]	*max*[2]	*min*[1]	*max*[2]
R1	Residence located approximately 375 feet west-southwest of the substation boundary.	38	51	43	44	52	6	1
R2	Residence located approximately 430 feet northwest of the substation boundary.	38	51	41	43	51	5	0
R3	Residence located approximately 610 feet south-southwest of the substation boundary.	38	51	40	42	51	4	0

NOTES
1. During the quietest measured background noise.
2. During loudest measured background noise.
3. Assumes the measured ambient sound levels are representative of R1, R2, and R3 ambient sound levels.
4. Based on OA operation.

Table 3
Predicted Future Background Sound Levels During Phase I Operation
Receptors Located 20 Feet Above Grade – FAFA Operation

Noise Receptor Locations		Measured Background Sound Level, dBA[3]		Predicted Facility Sound Level, dBA[4]	Future Background Sound Level w/ Facility, dBA		Future Background Sound Level Increase Due to Facility, dBA	
NML	Description	*min*[1]	*max*[2]		*min*[1]	*max*[2]	*min*[1]	*max*[2]
R1	Residence located approximately 375 feet west-southwest of the substation boundary.	38	51	45	46	52	8	1
R2	Residence located approximately 430 feet northwest of the substation boundary.	38	51	42	43	52	5	1
R3	Residence located approximately 610 feet south-southwest of the substation boundary.	38	51	42	43	52	5	1

NOTES
1. During the quietest measured background noise.
2. During loudest measured background noise.
3. Assumes the measured ambient sound levels are representative of R1, R2, and R3 ambient sound levels.
4. Based on FAFA operation.

The transformers are modeled as point sources. The point sources representing transformers T5-T8 are 16 feet above grade. The point sources representing T1-T4 are 12 feet above grade.

DTE Record Request 16

Request:

Please produce a graph like Figure 3.3, page 12 of Exhibit NEP-9, Environmental Noise Assessment by Black & Veatch, for the cases where six and eight transformers are operating at the substation.

Response:

The octave band data for all transformers proposed for installation is not available. However, based on the octave band data available for the 345/115 kV units (T5 through T8) in combination with available in-house data and data provided by the Edison Electric Institute (EEI) in the Electric Power Plant Environmental Noise Guide (1984), it is estimated that sound levels in the 125 Hz band and the 250 Hz band may increase from the values shown in Figure 3.3, page 12 of Exhibit DTE NEP-9, by 8 to 9 dB and 4 to 5 dB, respectively, for phase 1 construction and 10-12 dB and 6 to 8 dB, respectively, once all eight transformers are installed. The increase is primarily due to the 345/115 kV transformers and is based on the equipment specific data that is available for these units.

The proposed post-construction sound survey will provide exact information on octave band data after completion of phase 1 construction.

DTE Record Request 17

Request:

Please investigate exactly what is meant by the first sentence on the third paragraph, page 21 of Exhibit NEP-9, 'Environmental Noise Assessment'.

Response:

The statement is in reference to querying the transformer vendor to provide equipment that does not result in prominent discrete tones. However, equipment vendors do not always guarantee third-octave band sound level limits responsible for tonal noise. The feasibility of minimizing discrete tones may vary depending on the vendor and may require third-party mitigation (e.g., barrier walls).

DTE Record Request 18

Request:

What is the cost estimate for a sound wall to be located between the 115-to-69 kV transformers and the railroad berm? What the sound benefit of the sound wall would be under OA and FAFA operation of the transformers proposed under phase 1.

Response:

The best location and configuration for a sound attenuation barrier for the 115/69 kV transformers is a barrier of approximately 35' in length by 17' in height and located approximately 10' away from each transformer, in the direction of the three residences of interst. The cost of installing these four sound walls is estimated at $80,000.

Tables 4 & 5 reflect the effect of installing the proposed sound barriers on noise levels at the three residences of interest. Table 4 assumes all transformers operating at OA level. Table 5 assumes all transformers operating at FAFA level.

Table 4
Predicted Future Background Sound Levels During Phase I Operation - OA Operation
Includes Installation of Barrier Walls for T1-T4

Noise Receptor Locations		**Measured Background Sound Level, dBA[3]**		**Predicted Facility Sound Level, dBA[4]**	**Future Background Sound Level w/ Facility, dBA**		**Future Background Sound Level Increase Due to Facility, dBA**	
NML	Description	*min*[1]	*max*[2]		*min*[1]	*max*[2]	*min*[1]	*max*[2]
R1	Residence located approximately 375 feet west-southwest of the substation boundary.	38	51	41	43	51	5	0
R2	Residence located approximately 430 feet northwest of the substation boundary.	38	51	37	41	51	3	0
R3	Residence located approximately 610 feet south-southwest of the substation boundary.	38	51	39	42	51	4	0

NOTES
1. During the quietest measured background noise.
2. During loudest measured background noise.
3. Assumes the measured ambient sound levels are representative of R1, R2, and R3 ambient sound levels.
4. Based on OA operation.

The effect of a sound wall is minimal. Comparing the above values to those presented on DTE Record Request 13, Table 1, 'Predicted Future Background Sound Levels During Phase 1 Operation – OA Operation', we see a decrease of 1 dBA for residence R1 during the period of maximum background noise level and of 1 dBA for residence R2 during the period of minimum background noise level.

Table 5
Predicted Future Background Sound Levels During Phase I Operation - FAFA Operation
Includes Installation of Barrier Walls for T1-T4

Noise Receptor Locations		**Measured Background Sound Level, dBA[3]**		**Predicted Facility Sound Level, dBA[4]**	**Future Background Sound Level w/ Facility, dBA**		**Future Background Sound Level Increase Due to Facility, dBA**	
NML	Description	*min*[1]	*max*[2]		*min*[1]	*max*[2]	*min*[1]	*max*[2]
R1	Residence located approximately 375 feet west-southwest of the substation boundary.	38	51	42	43	52	5	1
R2	Residence located approximately 430 feet northwest of the substation boundary.	38	51	39	42	51	3	0
R3	Residence located approximately 610 feet south-southwest of the substation boundary.	38	51	41	43	51	5	0

NOTES
1. During the quietest measured background noise.
2. During loudest measured background noise.
3. Assumes the measured ambient sound levels are representative of R1, R2, and R3 ambient sound levels.
4. Based on FAFA operation.

Comparing the above values to those presented in Exhibit NEP-9, 'Environmental Noise Assessment', Table 4-2, 'Predicted Future Background Sound Levels During Phase 1 Operation', page 17, we see a difference of 1 dBA for residence R2 during the minimum background noise period.

Prepared by or under the supervision of Andres J. Molina, P. E.

DTE Record Request 19

Request:

Discuss alternatives to a sound-barrier wall, for the purposes of reducing sound towards the three residences. Discuss timing of installation Discuss the Company's noise mitigation measures.

Response:

Mitigating noise emissions from transformers is generally limited to specifying low-noise units and/or installing barrier walls. In order to maximize its benefit, a barrier wall should be tuned to reduce the noise in specified frequencies (i.e., 125 Hz and 250 Hz). This can be accomplished through coordination of the transformer vendor and the barrier wall vendor. In addition, the barrier wall should have an absorptive surface facing the noise source. The installation of sound walls for the 115/69 kV transformers can be done either during construction of the facilities proposed under phase 1 or after their completion.

Another way of reducing noise emanating from the proposed substation would be to purchase and install 115/69 kV transformers with lower noise levels in place of the proposed T1, T3 and T4 units. The cost of implementing this plan would be approximately $1,500,000.

Active noise control (ANC) devices have been used in the past, but are not that prevalent today. ANC uses the principle of destructive interference where the noise sound wave is sensed with a microphone. This signal is amplified and fed to a loudspeaker which emits it precisely 180 degrees out of phase with the original wave. For open 3-dimensional space such as rooms and back yards, and for most noise sources such as engines and transformers, a single loudspeaker ANC transducer close to that noise source will not work. A multiple loudspeaker ANC system may allow noise cancellation in one direction only.

The Company proposes to conduct a post-construction sound survey and use the information gained at that point to decide whether or not additional sound mitigation is appropriate and what that mitigation might include.